

[54] **ROTATABLE TRACK-MOUNTED SHUTTER BLINDS**

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[52] U.S. Cl. **160/172, 160/118**

[51] Int. Cl. **E06b 9/30**

[58] Field of Search 160/115, 118, 168-178, 160/165, 34; 49/51, 64, 73, 74, 86

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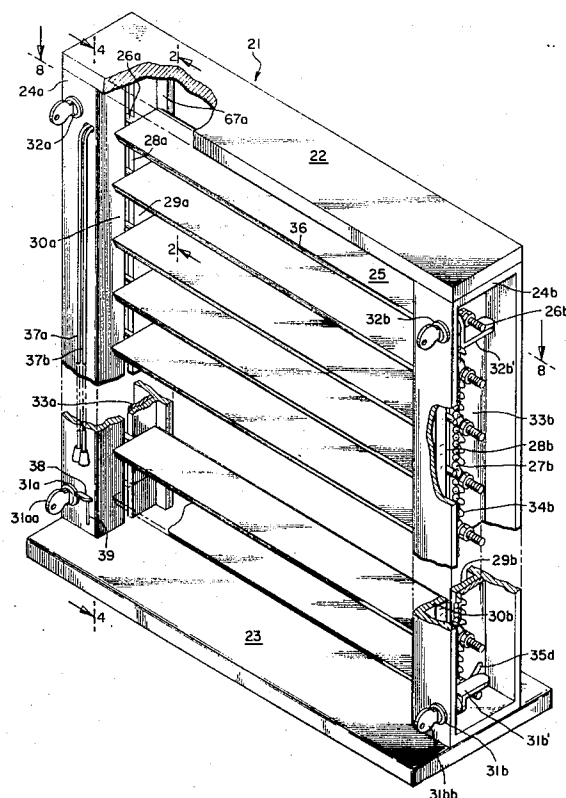
Primary Examiner—J. Karl Bell

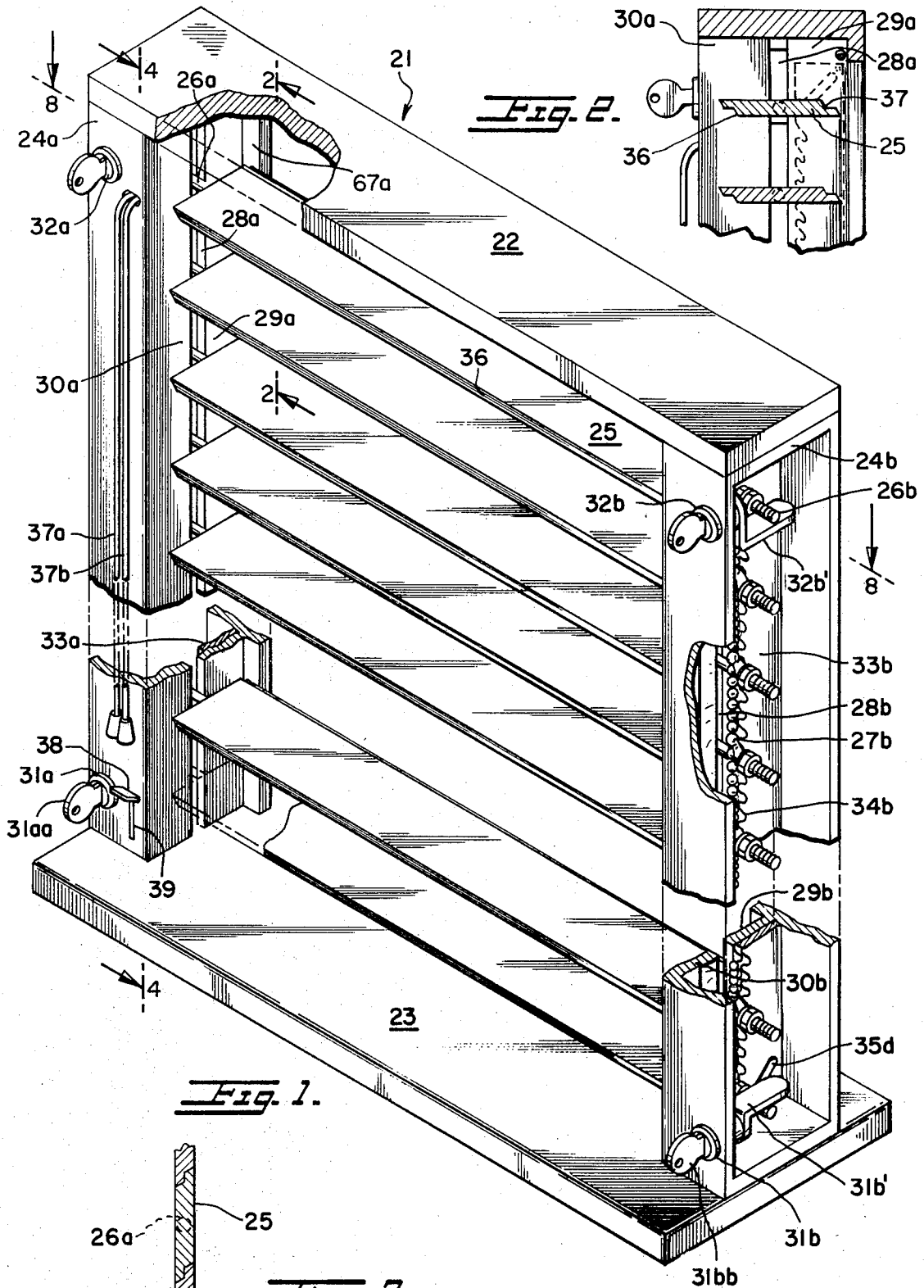
[57] **ABSTRACT**

In a preferred embodiment of the invention, there is provided a shutter blind unit having an annular shape as a window with each of the side upright supports provided with an inner face having an upright slot therein as a shutter blind track with the slots of the

spaced-apart upright supports facing one-another and there being a plurality of shutters mounted one over the other with axes of the opposite ends of each extending into and riding within the respective slots, within each slot there also being a plastic strip having a flexible edge biased against the axes to prevent gravity-pull falling downwardly of the respective shutters but being each shutter movable slidably along the track upwardly or downwardly by application of slight lifting or slight lowering force on the respective shutters, and each axis as it extends through the slot including a lever arm fixedly extending radially outwardly from the axial axis and being connected pivotably at its outer lever arm end to one end of one of two serially pivotably interconnected links and the free end of the other link being attached to a next adjacent lever arm end of a next adjacent axis, each shutter slat structure being fixedly rotatable with its respective axes extending from opposite ends thereof, and in a closed state adjacent edges of serially side by side parallel slat structures overlapping one-another to close-out the passage of light and defining seating structure to enhance the closing-out of light, and behind each slot on its upright support there being an inwardly extending shoulder blocking-out light between the end of respective shutter slat structures and the upright supports adjacent the slots such that in a closed state light is totally blocked from passage through the shutter blind unit.

12 Claims, 20 Drawing Figures





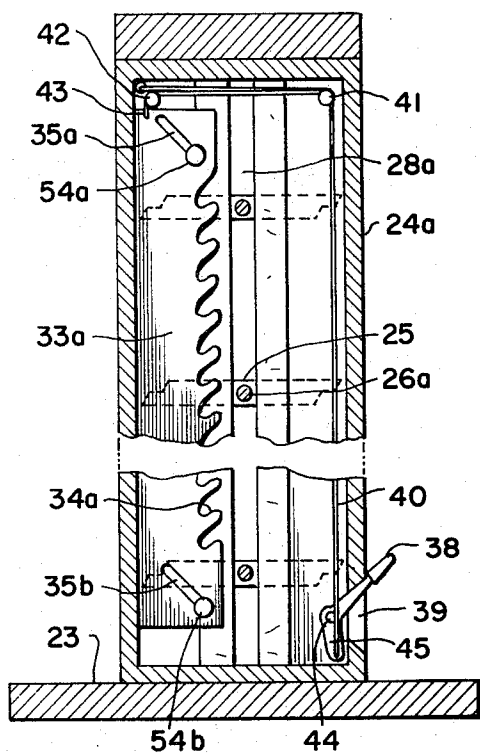


Fig. 4.

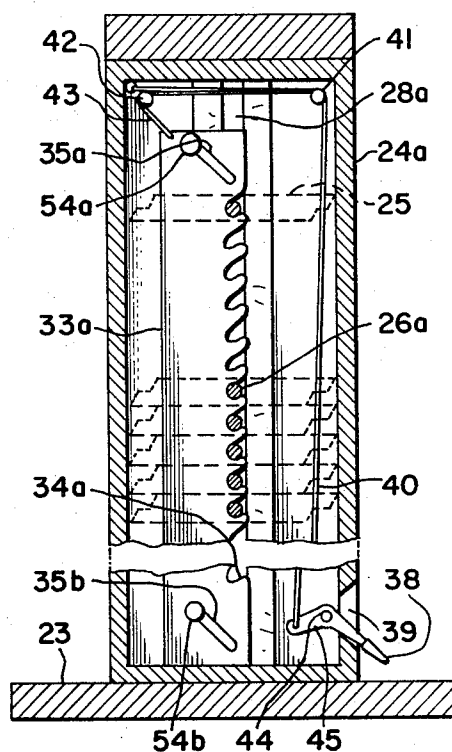


Fig. 5.

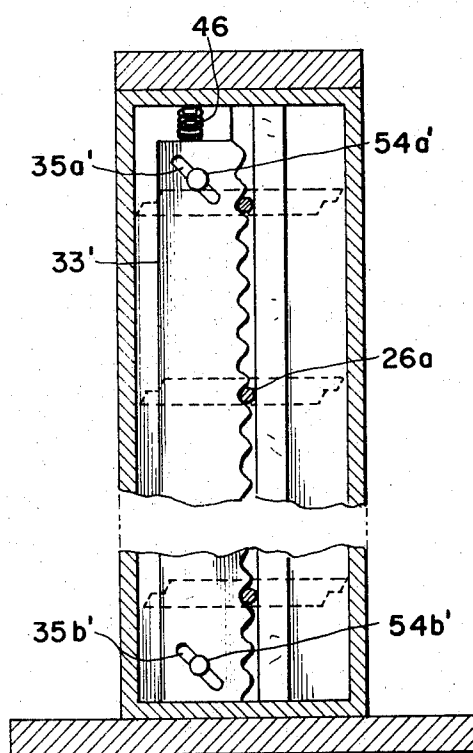


Fig. 6.

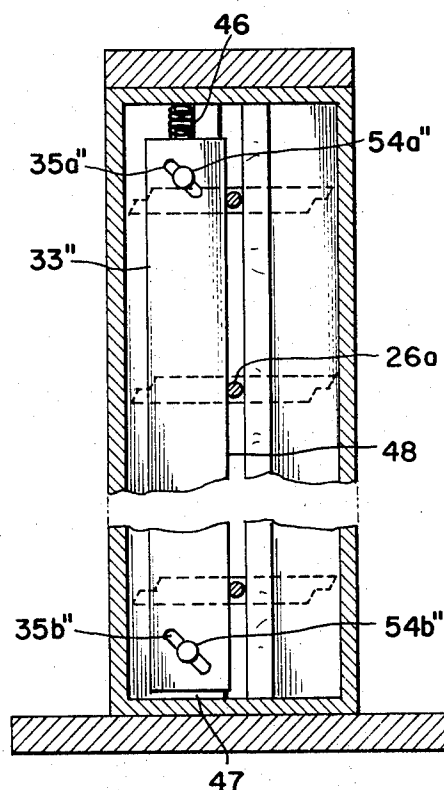
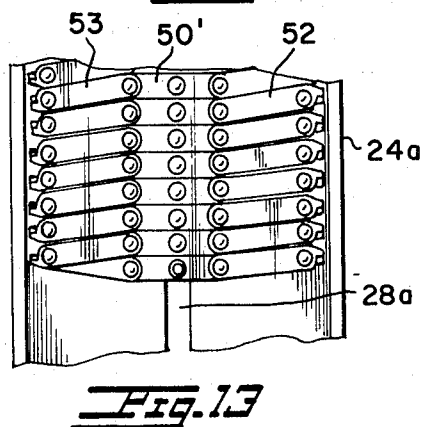
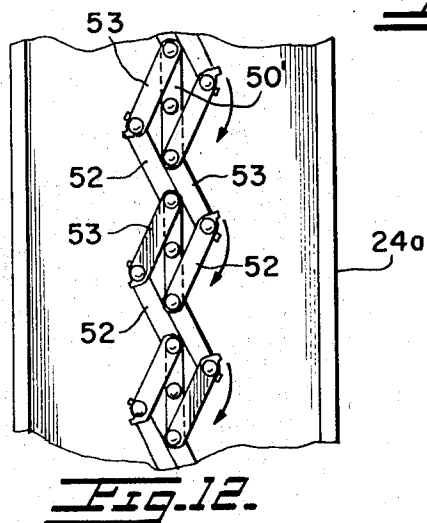
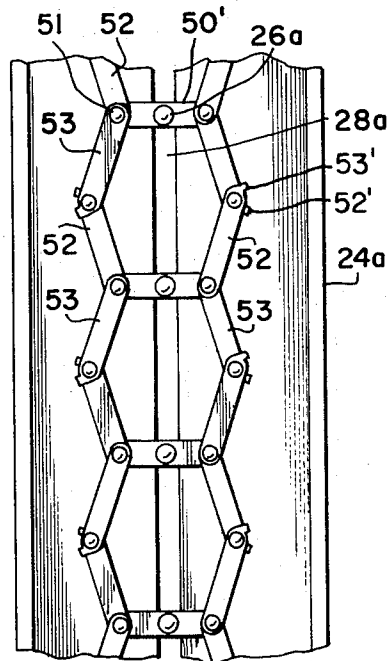
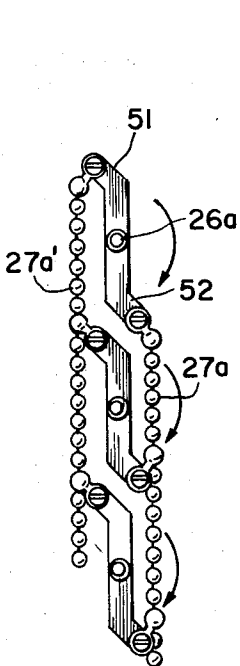
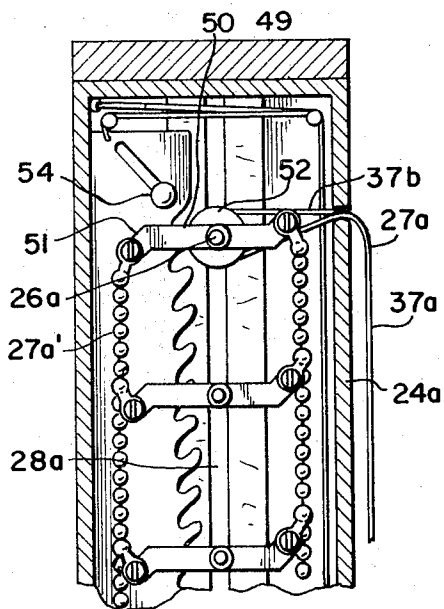
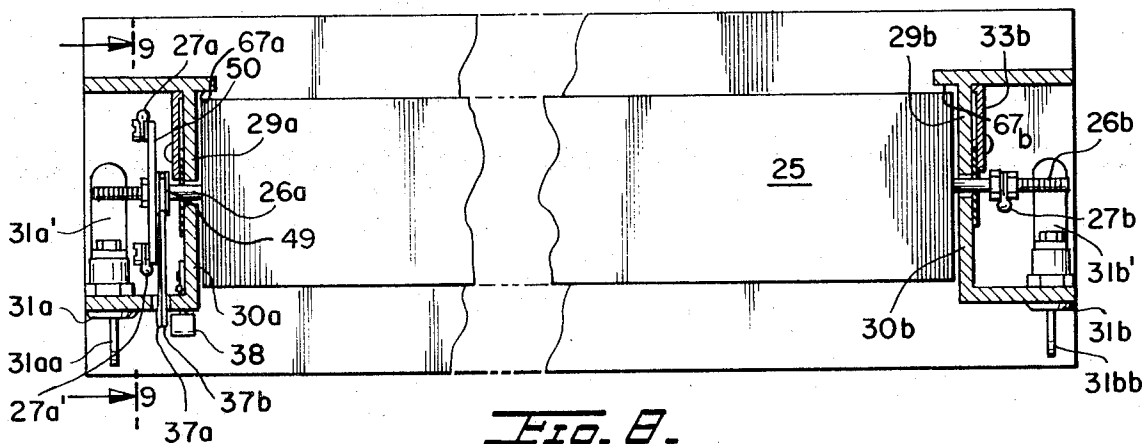


Fig. 7.



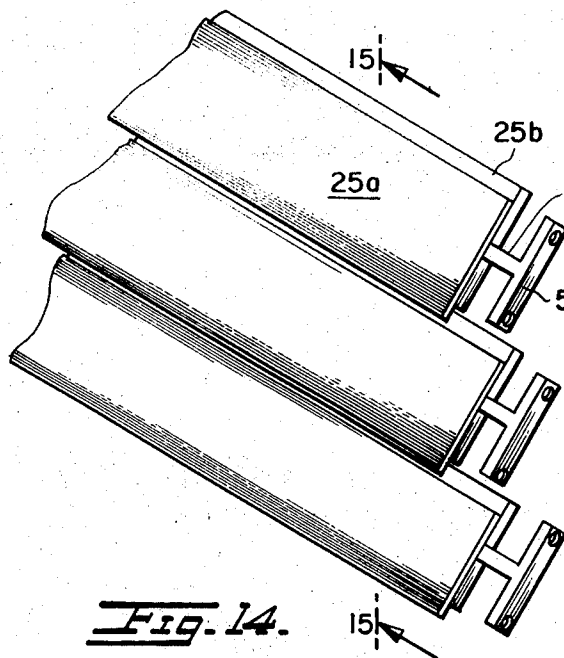


Fig. 14.

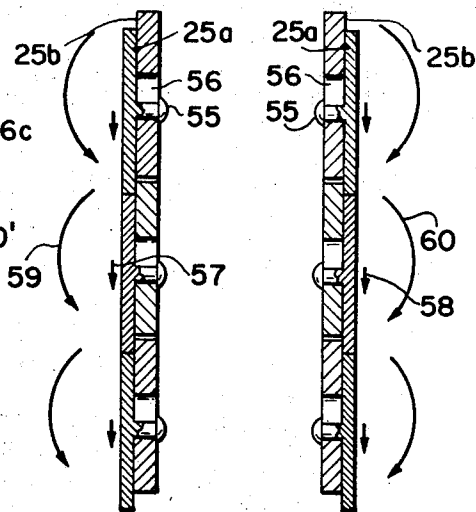


Fig. 15. Fig. 16.

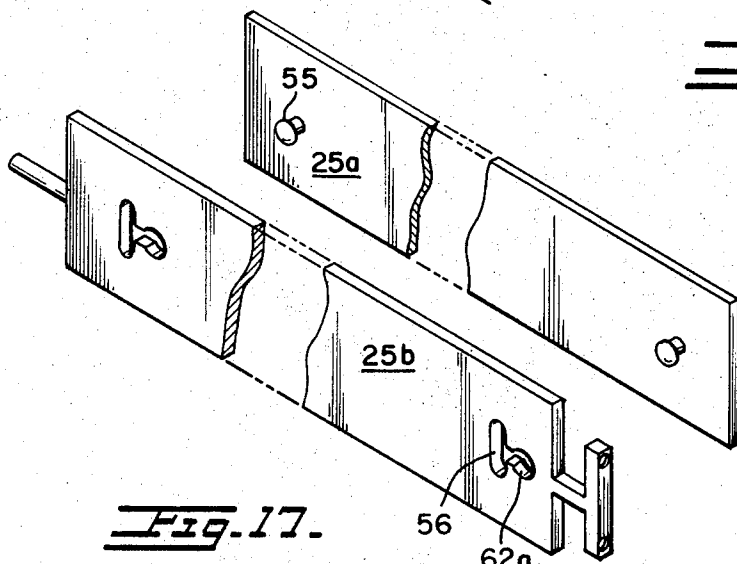


Fig. 17.

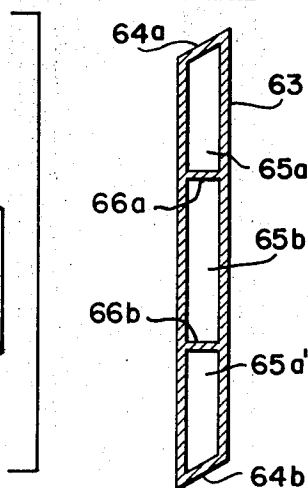


Fig. 20.

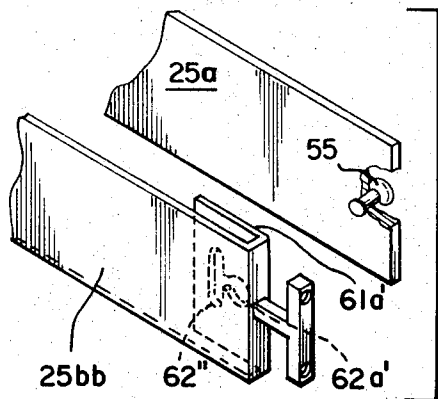


Fig. 18.

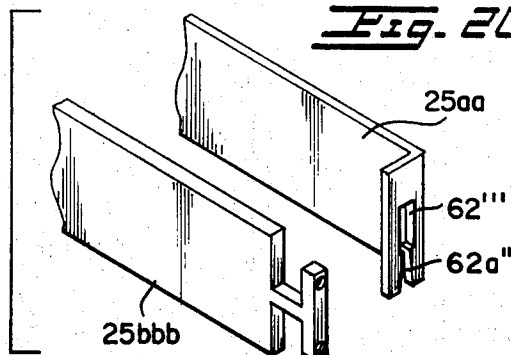


Fig. 19.

ROTATABLE TRACK-MOUNTED SHUTTER BLINDS

This invention relates to a shutter blind unit having novel and improved utilities and advantages over prior venetian blind type units.

BACKGROUND TO THE INVENTION DISCLOSURE

Prior to the present invention there have been attempts made toward obtaining a shutter blind of simplified structure and operation which concurrently rides on spaced tracks and can be turned at varying angles for ventilation and variations in light regulation, but heretofore such objects have not been fully attained. An example of a very complex mechanism and accordingly continued high cost of parts and manufacture thereof and assembling thereof is typically the venetian blind of U.S. Pat. No. 2,645,282, and also typically U.S. Pat. No. 3,520,346. In the U.S. Pat. No. 2,645,282 there is a complicated clutch-like mechanism with varying positions thereof. In the latter U.S. Pat. No. 3,520,346 there is a flange connected to each shutter and the flange is mounted on a hinge that by a complicated mechanism is caused to tilt on slidable rings that may be pushed up and down a bar. None of these mechanisms offer what the present inventors consider to be the desired simplicity and low cost of part and assemblage, as well as not having the novel advantages obtained by the present invention as described hereafter.

BROAD DESCRIPTION OF THE INVENTION

Accordingly, objects of the invention include the obtaining of the benefits of the types discussed above together with other novel advantages.

More particularly, an object of the present invention include the obtaining of a compact track unit of shutter blinds having aesthetically pleasing appearance while being easily operable and being of few and uncomplicated and easily assembled elements.

Another object is to obtain a revolvable shutter blind which closes tightly by freedom to rotate a full 180°.

Another object is to obtain a shutter blind which overlaps a lower shutter's edge such as to totally block line of sight and the passage of light.

Another object is to obtain a shutter blind which overlaps a lower shutter's edge irrespective as to the direction in which the upper shutter is turned to close the shutter.

Another object is to provide an easy and uncomplicated locking mechanism for locking blinds in any desired point of elevation.

Another object is to obtain a simple and effective mechanism for retaining against gravity raised shutters at desired heights together with ease of raising and lowering the shutters as desired.

Other objects become apparent from the preceding and following disclosure.

One or more objects of the present invention are obtained by the invention as defined herein.

Broadly the invention includes a shutter blind unit in the nature of a venetian blind but mounted with the shutters extending fixedly between opposite slots in spaced-apart upright supports with the respective shutters slidable within the slots upwardly and downwardly as adjusted as desired and tiltable through a 180° varia-

tion in angle on a fixedly mounted axis extending preferably through the respective opposite slots and each extended axis including laterally radially outwardly extending axis structure as a lever having pivotably attached to an outer portion of the lever structure linking elements linking together outer portions of upper and lower lever structures of upper and lower axes of the various horizontally extending shutters, and there being included retainer means for securing the shutters at any desired point to which they have been raised, and preferably also there being lock elements for securing the shutters imovably in predetermined positions of lowered or partially raised state or the like. Also, preferably there is provided overlapping seating structure between the adjacent edges of the shutter slats for obviating the passage of any light and also preferably a special slidable slat which brings about overlapping irrespective of the direction of tilt by virtue of the slat being slidable by the pull of gravity, to slide on a shutter frame. Also preferably light between shutter ends and the support upright slot structures is obviated by shoulder structures extending inwardly into the window space along the upright length of each of the support upright slot-defining structures to thereby block-out and thus obviate any possibility of light therethrough when the shutters are down and/or closed. Optionally there may be also conventional cranks and/or cords or the like to raise and/or lower the blinds, or alternatively the raising may be by mere manual adjustment of the slats upwardly and downwardly as desired. In a preferred embodiment there is provided a plastic or other suitable strip having a flexible edge, lineally along both slots extending into the slots sufficiently, or at least into the path of the oppositely extending shutter axes sufficiently as to press against the respective axes to bias the axes against the opposite walls of the respective slots to thereby prevent the axes from sliding downwardly by the pull of gravity on the mass of the shutter structures, but being typically sufficiently flexible as to yield to light pressure or force serving to slide the axes along the respective slots. In another preferred embodiment, there are slanted notches in the face of the wall on one or the other side of the slot such that the axes may be seated therein at any desired level or height as a means of securing the shutters at that height, or as a means of lowering from the top the shutters to a selected desired point. In another embodiment, the notches are along a separate strip mounted in a biased state against the respective axes and having lever and handle structural elements for relieving pressure of the spring-biased notched strip away from the respective slots out of the paths of the axes thereby allowing the shutters to be raised and/or lowered. In a preferred connector mechanism of the outer lever portions between the serially aligned axes, the connector includes two links pivotably interconnected to one-another at one end of each, and at the remaining opposite ends of the respective links, being connected each pivotably to the lever arms being interconnected by the connector, the intermediate pivotable link action permitting a full 180° freedom of tilt of the respective tilt lever arms in the tilting angularly of the respective shutter slats.

Other features of the invention become apparent from the following Figures and the detailed description thereafter.

THE FIGURES

FIG. 1 illustrates a typical embodiment of the present invention in perspective top and side view as a unit would appear before mounting in a window or as a part of a window casing.

FIG. 2 illustrates an in-part cross-sectional side view as taken along lines 2—2 of FIG. 1.

FIG. 3 illustrates an in-part view in side cross-section of a series of revolvable shutters in a closed state, illustrating the interlocking light-excluding features of the shutters of the embodiment of FIG. 1.

FIG. 4 illustrates detail structure as to mechanism, in side in-part cross-sectional view as taken along lines 4—4 of FIG. 1.

FIG. 5 is the same view as that of FIG. 4, except with the shutter-release lever in the down shutter-locking position.

FIG. 6 is a view which corresponds to those of FIGS. 4 and 5 but of an alternate embodiment of shutter retaining mechanism.

FIG. 7, a view that also corresponds to FIGS. 4 through 6, illustrates still another embodiment for retaining the shutters at any desired height.

FIG. 8 illustrates an in-part cross-sectional view as taken along lines 8—8 of FIG. 1.

FIG. 9 is a side view as taken along lines 9—9 of FIG. 8.

FIG. 10 is a diagrammatic view in side view corresponding to that of FIG. 9, the FIG. 10 illustrating the mechanism of operation to turn the axes on which the shutters are fixedly mounted.

FIG. 11 is an in-part side view corresponding to that of FIG. 9, but FIG. 11 representing an alternate and preferred embodiment having links rather than a chain type of connectors.

FIG. 12 corresponds to that of FIG. 10, except FIG. 12 illustrating the mechanism of operation of the FIG. 11 embodiment.

FIG. 13 illustrates the typical appearance of the FIG. 11 embodiment when the shutters are raised from the bottom to become compacted one on top of the other, the view corresponding to that of FIGS. 11 and 12.

FIG. 14 illustrates diagrammatically in an in-part view in side perspective overhead view, a preferred shutter blind, illustrating solely the shutters devoid of frame illustration.

FIG. 15 illustrates a part of the operation of the shutters of FIG. 14, in side cross-sectional view. FIG. 16 is a view analogous to that of FIG. 15, except representing slanting the shutters in the opposite 180° direction.

FIG. 17 illustrates in exploded perspective view the typical alternate structure of the FIG. 14 blinds, while FIG. 18 is representative of the FIG. 14 shutters. FIG. 19 as an in-part view in side overhead perspective illustrates still another view of still another alternate and preferred embodiment which works substantially the same as illustrated in FIGS. 15 and 16.

FIG. 20 illustrates a side cross-sectional view of an alternate slat construction, showing the hollow nature thereof, as well as slanted edges that mesh with shutters above and below when closed.

DETAILED DESCRIPTION OF THE INVENTION

FIG. 1 illustrates a typical embodiment of the present invention shown in side top perspective view.

FIG. 2 illustrates an in-part side view in partial cross-section as taken along lines 2—2 of FIG. 1.

FIG. 3 illustrates in side cross-sectional view the typical inter-locking appearance of the shutter blinds of each of FIGS. 1 and 2 when in a closed state.

FIG. 4 illustrates a side view in in-part cross-section of the embodiment of FIG. 1 as taken along lines 4—4 of FIG. 1.

FIG. 5 illustrates a different state of being of the embodiment of FIG. 4, in a corresponding view thereof.

FIG. 6 illustrates an alternate embodiment to that of FIGS. 1 through 5, in a view corresponding to that of FIG. 5.

FIG. 7 illustrates still another embodiment in a view corresponding to that of each of FIGS. 5 and 6.

FIG. 8 illustrates a view as taken along lines 8—8 of FIG. 1, in partial cross-section.

FIG. 9 illustrates a more complete side view, in partial cross-section, of the same side as illustrated in FIG. 4, except additionally disclosing the lever arms fixedly interconnected to their respective axis per shutter blind, and the connector chains.

FIG. 10 illustrates an in-part view in side view in a view that corresponds substantially to that of FIG. 9 except that the lever arms are shown turned to a different angle state of being typical of the position to achieve the FIG. 3 appearance of the consecutive shutter blinds.

FIG. 11 corresponds to a view substantially analogous to that of FIG. 9, illustrating an alternate embodiment of lever arms and of connectors thereof.

FIG. 12 illustrates a different state of being in an analogous view of the embodiment of FIG. 11, in a state of being corresponding to the state of being illustrated for FIG. 10 of that embodiment.

FIG. 13 illustrates in a view analogous to FIGS. 11 and 12, a state of being of that embodiment when several shutters have been raised to a position such as that shown in phantom in the FIG. 5 embodiment.

FIG. 14 illustrates an in-part side perspective view of a series of vertically arranged shutter blinds with their respective integrally fixed axes and the lever arms thereof of the type shown in FIG. 11, in which the respective shutter blinds each have a preferred construction including a slidable face for overlapping shutter blind structure below each respective shutter blind.

FIG. 15 illustrates a side cross-sectional view as taken along lines 15—15 of FIG. 14.

FIG. 16 illustrates a view analogous to that of FIG. 15, except in a state of being of a different angle at 180° turn from that of FIG. 15, such that the slidable face slides in the opposite direction to that of FIG. 15, as controlled by the pull of gravity.

FIG. 17 illustrates a typical back-side perspective side view of the embodiment of FIGS. 14 through 16, in exploded view.

FIG. 18 illustrates an alternate embodiment to that of FIG. 17, in an analogous view thereof, for effecting the slid mechanism.

FIG. 19 illustrates still another embodiment to that of FIGS. 18 and 19, in which the slide mechanism is effected.

FIG. 20 illustrates a shutter blind in cross-section of another embodiment of the invention.

DETAILED DESCRIPTION

In greater detail, FIGS. 1 through 4, and 8 through 10

illustrate one particular embodiment of the present invention in different and varying views thereof. In FIG. 1, the overall window structure 21 includes upper cross-support 22 and base cross-support 23 extending respectively between vertical side supports 24a and 24b respectively. Each of the respective shutter blinds 25 is mounted fixedly on an axis having oppositely extending axis ends 26a and 26b, of which typically connector chain 27b interconnects serially arranges axes 26b, whereby lower axes are suspended from the upper axes. The respective axes 26a and 26b ride in their respective slots 28a and 28b, the slot 28a being defined between forward member 30a and rearward member 29a, and similarly the slot 28b being defined between forward member 30b and rearward member 29b. Lock mechanism 31a in the forward face of member 30a with the key 31aa, correspond to the lock mechanism 31b in the forward face of member 30b with the key 31bb, the flange 31b' being revolvable around a central point with and upon the turning of the key 31bb in the cylinder 31b such that the flange 31b' is lockable retainably over the lower-most axis of the axes 26b; in a similar manner, a lower most axis 26a is lockable by a flange 31a' (see FIG. 8) of the cylinder 31a. Other lock structures of cylinders 32a and 32b are constructed and operate according to analogous principles, and construction. In parallel alignment extending vertically along side each respectively of sides 29a and 29b, are the respective downwardly recessed-notched slide strips 33a (FIG. 4) and 33b (FIG. 1) having notch seats 34a (FIG. 4) and 34b (FIG. 1) respectively for the seating therein of axes 26a and 26b respectively at any point of elevation as illustrated in FIG. 5. Each of slide strips 33a and 33b include upper through-slots 35a (FIG. 4 and FIG. 5) and 35b (not visibly illustrated) angled downwardly and forwardly from a rearward high point each respectively, and lower through slots 35c and 35d of FIGS. 4 (and 5) and 1 respectively. Each of strips 33a and 33b ride slidably on keys such as 54a for slot 35a and 54b for 35a slot, other keys and slots being of corresponding numbers. Accordingly each strip 33a and 33b moves forwardly by virtue of each of gravity and/or biasing spring(s) 46 (See FIGS. 4, 5, 6, and 7), whereby when pressed or lowered forwardly the axes 26a and 26b respectively become seated in the seats or recesses along the edge of the strip. In the embodiment of FIGS. 4 and 5, lever 38 in the upward state of FIG. 4 pivotably on axis pin 44 holds line 40 in the downwardly-pulled and locked state with the strip 33a locked in an upward state by virtue of the line 40 having passed the center of gravity-pull for lever 38 as illustrated in FIG. 4. Upon a lowering of the lever 38 as in FIG. 5, the strip 33a is lowered such that the respective axes are caused to become seated within seats 34a as the structure of the seats transverses the slot 28a, the handle moving in aperture 39. The embodiment of FIG. 6 differs principally in that the strip 33' is always biased against the axes 26a and because it is not fixedly locked but merely spring biased is intermittently reciprocable by mere upward or downward light pressures on the axes 26a shutter blinds may be lowered or raised at will without the necessity of locking or unlocking the strip from its biased position across the slot 28a. FIG. 5 embodiment need not be unlocked to raise shutters, but must be unlocked to lower the shutter blinds. In FIG. 7, there is provided a plastic strip 33'' (not necessarily plastic but preferably plastic) having a smooth forward edge 48

continuously biased against the axes 26a sufficiently to prevent upward and downward movement of the shutters except when upward and downward pressures — one or the other — is applied to the shutter blinds to raise or lower respectively the shutter blinds or a part thereof. FIG. 8 has been described with reference to parts formerly discussed.

FIG. 9 illustrates how the cord ends 37a and 37b are continuous with one-another and envelope the angle-control wheel 49 (See FIGS. 1 and 9), the wheel 49 being fixedly anchored to the lever top arm 50 such that the arm 50 turns with the wheel 49. The extender-projections 51 serve to make possible a full 180 degree turn of each of the shutters and axes thereof without interruption of the chain connectors with one-another, in the manner shown in FIG. 10. FIGS. 11 and 12 represent a preferred connector arms embodiment with upper connectors 53 and lower connectors 52, having elbow stop flanges 53' and 52' limiting inward movement of the elbow section thereof. FIGS. 12 and 13, respectively, illustrate the extended closed state and the compacted raised-position state each respectively of the embodiment of FIG. 11.

FIG. 14 illustrates a preferred embodiment of a shutter blind construction in which a slide member will slide-by-gravity pull to overlap a lower shutter blind to thereby prevent any passing of light between adjacent shutter blinds and as well to overlap shutter blind structure of the next-below shutter blind in the same manner as illustrated in the embodiment (of different construction) of FIG. 3, with meshing edges.

FIGS. 15 and 16 each respectively illustrate the direction of slide as dependent upon the direction in which the particular shutter blind has been rotated, the FIG. 16 representing a 180° turn from that of FIG. 15, when rotated in direction 59 the slide member 25b sliding in direction 57 and when rotated in direction 60 the member 25b sliding in direction 58 on pins 55 in slots (through-slots) 56. For improved understanding, the structures of FIGS. 14, 15, and 16 are shown in exploded view in FIG. 17. The embodiment of FIG. 18 having face 25aa and U-shaped flange 61a' with insert opening 62a' (shown in phantom) and its slide-slot 62'', has a more neat (no apertures) forward face 25aa, as compared to the member 25a having forward face through-slots therethrough. In the FIG. 18 embodiment, the slide member fits between the main body of the forward face 25aa and the rearward flange 61a'. In the FIG. 19 embodiment, the position of the slide member 61aa corresponds to that of FIG. 18, except that an end flange is located on each of opposite ends of the slide member 61aa, and each end flange has an insertion slot 62a' for the axis 26'' of squared cross-section over which the end flange is slidable by virtue of slot 62''.

The FIG. 20 shutter-blind embodiment in side cross-sectional view illustrates an alternate embodiment having slanted edges 64a and 64b for mesh-seating with adjacent shutter blinds in the closed shutter-blind state in an over-lapping state to better exclude all light, and has hollow spaces 65a and 65b effecting lighter weight, with cross-members 66a and 66b imparting strength and rigidity thereto as well as providing upper and lower supports between which a shutter axis such as member 61 of FIG. 17 is receivable.

From each rearward edge of respectively structures 29a and 29b, flange strips 67a and 67b (see FIGS. 1 and

8) extend laterally inwardly to block light from passing the ends of the respective shutter strips.

The shutter axis may be a continuous bar preferably hollow and is preferably metal, as an antiburglar bar-device.

It is within the scope of the present invention to make modifications and substitutions of equivalents within ordinary skill.

We claim:

1. A shutter device comprising, in combination: a support structure defining two spaced-apart track structures each track structure defining a forward wall and a rearward wall, the forward and rearward walls being spaced-apart a predetermined slot distance defining a slot therebetween, with the slot defined by one of the track structures being spaced laterally from and opposite to the slot of the other of the track structures, each slot extending substantially uprightly; a plurality of side by side shutter means each about horizontally extending in substantially parallel alignment and in substantially series with one-another, the opposite ends of each shutter means being mounted slidably to and fro within and along the respective opposite slots, each shutter means including extending from each of opposite ends thereof an axis structure extending longitudinally the opposite end axes being about coaxial to one-another, and the shutter means further including an elongated slat structure fixedly mounted to and between the coaxial axes at opposite ends of the slat structure; and connector means interconnecting in series, for each of the opposite ends of each shutter means, side by side axes slidably mounted within a common one of the slots, there being a separate connector means interconnecting each two serially arranged axes pivotably attached at one end of the connector means to one of the interconnected two and pivotably attached at an opposite end of the connector means to the other of the two, such that each lower one of the plurality is suspended from an immediately-above shutter means in juxtaposition therewith, each axis of each shutter means including lever structure fixedly extending transversely radially outwardly from the longitudinal axial axis of the axis structure and the respective axis structure being connected at its radially outward end portion to said connector connected thereto such that the each slat structure is rotatable with the axes thereof by movement of the connector means.

2. A shutter device of claim 1, including positioning means for positioning the plurality intermittently along the opposite slots, such that the bottom or lower slat structure may be varied at alternate predetermined heights along the opposite slots.

3. A shutter device of claim 2, including locking means for locking the plurality of shutter means at predetermined positions against further to and fro movement along the respective opposite slots.

4. A shutter device of claim 3, in which the upright track structures each include a laterally inwardly extending shoulder such that the respective shoulders of the opposite track structures extend toward one-another, each shoulder being spaced rearward from and parallel to each respective slot of its respective track structure whereby when the series of shutter means are turned to a closed position, light is blocked from passing between the ends of the slat structures and the track structures.

5. A shutter device of claim 4, in which the connector means are each of predetermined length dimensions such that respective series of interconnected shutter means are positioned to overlap one-another when the respective slat structures are turned to a closed-blind state whereby passage of light is obviated between adjacent parallel slat structures.

6. A shutter device of claim 5, in which the respective shutter means are structured such that in a closed shutter state, the edge of one shutter means defines a seat-recess receivable of an adjacent edge of a next serially mounted shutter means, and such that an edge of each shutter means opposite from its respective seat-recess edge defines an edge structure seatable in a seat-recess of a next serially mounted shutter means.

7. A shutter device of claim 6, in which connector means comprises in series two link structures having one end of each pivotably interconnected with one end of the other and having the opposite end of one link structure connected to the lever structure of one shutter means and the opposite end of the other link structure connected to the lever structure of the other shutter means.

8. A shutter device of claim 5, in which each shutter structure includes a slidably mounted slat element of elongated flat narrow shape and includes slat-element mounting structure providing for to and fro sliding freedom of movement by gravity in a transverse direction across the width of each shutter means whereby in a closed state of the plurality each slat element overlaps an upper edge of the shutter means therebeneath.

9. A shutter device of claim 2, in which the positioning means includes a series of downwardly slanted indentation seats of widths each greater than respective diameters of the respective axes, the angular indentation seats being in series with one-another along a face of slot-defining wall structure facing the respective axes such that the respective axes are seatably receivable within the indentation seats whereby raised lower shutter structures may be retainably seated at any predetermined height.

10. A shutter device of claim 2, in which the positioning means includes a toothed elongated structure having teeth along one edge thereof longitudinally and the toothed structure being positioned adjacent the slot, there being a separate toothed structure for each track means slot, in including toothed-structure mounting means and spring-biasing means and lever means for each toothed structure such that the toothed structure is biased normally against the respective axes to hold the axes in a predetermined position along its respective slot and the handle means being structured and positioned to actuate a toothed structure lever against biasing action of the spring-biasing means to thereby relieve pressure against the axes whereby the lower shutter means may be raised or lowered to and fro.

11. A shutter device of claim 2, in which the positioning means includes a flexible strip mounted within each track structure slot having a flexible edge of the flexible strip biased against the axes such that the axes are forcibly slidable along the slots but are retained against movement along the slots against gravity.

12. A shutter device of claim 3, in which the locking means comprises a lock lever arm insertable between at least two serially connected ones of the axes.

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